PATENT ABSTRACTS OF JAPAN

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(54) INK JET RECORDING INK

(57)Abstract:
PURPOSE: To obtain an ink jet recording ink highly rapid in infiltration, almost no blurring even regenerated paper under nonheated state, comprising a water- soluble dye, specific glycol ether-based compound(s), a specific surfactant and water.
CONSTITUTION: This ink essentially comprises (A) a water-soluble dye, (B) propylene glycol mono-n-butyl ether and/or dipropylene glycol mono-n-butyl ether, (C) an acetylene glycol-based surfactant pref. ≤30 in HLB number at 15° C, and (D) water. Besides, it is preferable that a water-soluble glycol is contained ether at 0.3 to <-20wt. times the component B and at ≤ 40wt.% of the whole ink.

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CLAIMS

[Claim(s)]

[Claim 1] Ink for ink-jet record characterized by including the (A) water soluble dye, a (B) propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, (C) acetylene glycol system surfactant, and (D) water at least.

[Claim 2] Ink for ink-jet record according to claim 1 characterized by the whole ink containing a water-soluble glycol ether 40 or less % of the weight 0.3 or more times as a component of the aforementioned ink for ink-jet record by less than 20 times of the amount of the propylene-glycol monochrome-n-butyl ether (aforementioned [B]) and/or a dipropylene-glycol monochrome-n-butyl ether.

[Claim 3] Ink for ink-jet record according to claim 1 in which it is the nonionic surfactant of the aforementioned acetylene glycol system surfactant, and concentration is characterized by 10PPM or more being 10000PPM or less.

[Claim 4] the ink for ink-jet record according to claim 1 which HLB of the aforementioned acetylene glycol system surfactant is alike, sets at 15 degrees C, and is 30 or less

[Claim 5] Ink for ink-jet record according to claim 1 whose surface tension of the aforementioned ink for ink-jet record is 15 or more mN/m 40 or less mN/m.

[Claim 6] Ink for ink-jet record according to claim 1 in which viscosity of the aforementioned ink for ink-jet record is characterized by using the mechanism in which the ink at the nose of cam of a nozzle breathes out and twists, and vibrates like in ordinary temperature at the time of 3 or more mPa-s.

[Claim 7] Ink for ink-jet record according to claim 1 characterized by including 1PPM or more 10000PPM or less of fluorochemical surfactants at the aforementioned ink for ink-jet record.

[Claim 8] Ink for ink-jet record according to claim 1 characterized by including glycols in the aforementioned ink for ink-jet record below 25% weight more than 3% weight.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] this invention relates to the ink for ink-jet record in which a high quality of printed character is obtained to a regular paper, recycled paper, coat paper, or an OHP form.
[0002]
[Description of the Prior Art] Ink-jet record is the method of injecting ink as a globule from a detailed nozzle, and recording a character and a figure on a recorded body surface. An electrical signal is changed into a machine signal, using an electrostriction element as an ink-jet recording method. The ink stored in the nozzle head portion is injected continuously or intermittently, and the part very near an injection portion is quickly heated for the method of recording a character and a sign on a recorded body surface, and the ink stored in the nozzle head portion, a bubble is generated, it injects continuously or intermittently, and the method of recording a character and a sign on a recorded body surface etc. is put in practical use.
[0003] Properties, like that there is no bleeding of that the drying property of printing is good or printing in the ink used for such ink-jet record and it is uniformly printable to all recorded body surfaces are demanded. Here, I hear that it is easy to produce generating of bleeding by the fiber from which the permeability is different, and it is to become especially a problem, when paper is used as the recorded body.
[0004] There were many water-soluble organic solvents or examples which were used as a color dissolution accelerator like JP,2-3837,B like JP,1-15542,B in using a glycol ether as a wetting agent like JP,2-2907,B in the conventional ink for ink-jet record.
[0005] Moreover, in order to raise permeability, SAFI Norian 465 which is the surfactant of an acetylene glycol system like a U.S. Pat. No. 5183502 specification in adding the diethylene-glycol monobutyl ether like a U.S. Pat. No. 5156675 specification is added, or adding both the diethylene-glycol monobutyl ether and SAFI Norian 465 like a U.S. Pat. No. 5196056 specification etc. is examined. From the first, a diethylene-glycol monochrome-n-butyl ether is called butyl carbitol, for example, is indicated by the U.S. Pat. No. 3291580 specification. Or using the ether of a diethylene glycol for ink is examined by the U.S. Pat. No. 2083372 specification.
[0006]
[Problem(s) to be Solved by the Invention] However, it had the technical problem that the permeability of a Prior art will be inadequate and it will spread to the recycled paper used abundantly by the environmental problem etc. a regular paper, especially in recent years. The component of various papers is mixed, and although the osmosis speed differs, since recycled paper is the aggregate, it tends to bleed according to the difference of those osmosis speed. In order to reduce the bleeding, while printing generally, the method which heats paper is examined. However, when printing and paper etc. is heated, the technical problem that rising to the predetermined temperature of the heating unit in equipment takes time, the power consumption of the main part of equipment becomes large, or a damage is given to the printed object of paper and others occurs.
[0007] Then, this invention solves such a technical problem, and the place made into the purpose has very quick permeability, and is located in the place which says that printing which

hardly spreads even if it does not establish especially a heating means to the recycled paper used abundantly by the environmental problem etc. a regular paper, especially in recent years is possible.
[0008]
[Means for Solving the Problem] It is characterized by the ink for ink-jet record of this invention containing the (A) water soluble dye, (B) propylene-glycol monobutyl ether and/or the dipropylene-glycol monobutyl ether, (C) acetylene series surfactant, and (D) water at least.
[0009] this invention is based on the result examined wholeheartedly in view of properties, like that there is no bleeding of that the drying property of printing is good or printing in the ink used for ink-jet record and it is uniformly printable to all recorded body surfaces being demanded.
[0010] In this invention, the addition of (B) propylene-glycol monobutyl ether of a claim 1 and/or the dipropylene-glycol monobutyl ether has a direction near 10 % of the weight in the inclination whose bleeding of printing decreases. In this case, even if it is dissolving in ordinary temperature by the water-soluble glycol ether etc., for example at 40 degrees C, (B) propylene-glycol monobutyl ether of this claim 1 and/or a dipropylene-glycol monobutyl ether component carry out phase separation to the (A) color or the water component of (D). In order to suppress this, using glycols wholeheartedly as a result of examination found out the good thing. Although viscosity printable [with this ink-jet method] cannot generally be said since it changes by the addition of additives, such as other glycols, and a color, or the ****** type of ink, it is desirable to add so that the viscosity of ink may become less than 10 mPa-s by the real service temperature (15 degrees C - 40 degrees C) of a printer.
[0011] In this invention, when blending the (A) water soluble dye, (B) propylene-glycol monobutyl ether and/or the dipropylene-glycol monobutyl ether, (C) acetylene glycol system surfactant, and (D) water and making ink, additives, such as antiseptics, an antioxidant, a conductivity regulator, pH regulator, a viscosity controlling agent, a surface tension regulator, an oxygen absorbent, and a blinding inhibitor of a nozzle, can be suitably used as the component.
[0012] It is required for the whole less than 20-time hidden 0.3 or more time ink of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether to contain a water-soluble glycol ether 40% or less as a component of the above-mentioned ink for ink jets. Although the amount of a propylene-glycol monochrome-n-butyl ether does not become a problem so much in 2% or less of ink, if about 1% is exceeded in a dipropylene-glycol monochrome-n-butyl ether, other ink components will carry out phase separation to ****** exceeding 2% also in ordinary temperature. Above 40 degrees C, it further becomes easy to carry out phase separation. Therefore, a water-soluble glycol ether with an amount [of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether] of 0.3 or more times is needed. moreover, by the water-soluble organic solvent which exceeds 20 times of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, or exceeds 60% of the amount of the whole ink, when dryness of ink takes time and printing becomes easy to bleed, there is an inclination acquired and said Therefore, this is 20 or less times, and it is necessary to make it into 60% or less of the ink whole quantity.
[0013] The concentration of the above-mentioned acetylene glycol system surfactant is ineffective in less than 10PPM, and since it does not accept, it is necessary to add 10PPM or more of improvement in a quality of printed character. Moreover, since it becomes, or is easy to deposit, it becomes that it will be easy to foam if 10000PPM is exceeded and stable printing becomes impossible, it is necessary to be 10000PPM or less.
[0014] If it will become difficult to hold ink in the front face of a nozzle if it is not 15 or more mN/m, and it becomes easy to produce the dot omission of printing and the surface tension of the above-mentioned ink for ink-jet record surpasses 40 mN/m, the osmosis speed to the paper of printing becomes slow, in the paper which cannot permeate easily, it becomes easy to bleed and a quality of printed character will deteriorate. Therefore, surface tension needs to be 15 or more mN/m 40 or less mN/m.
[0015] As a color which is (A), there are direct dye, acid dye, basic dye, a reactive dye, a food dye, etc. The C.I. name of a water soluble dye Use, and when shown, the direct dye C.I. direct

blacks 2, 4, 9, 11, 14, 17, 19, 22, 27, 32, 36, 41, 48, 51, 56, 62, 71, 74, 75, 77, 78, 80, 105, 106, 107, 108, 112, 113, 117, and 132, 146, 154, 168, 171, 194, the C.I. direct yellow 1, 2, 4, 8, 11, 12, 24, 26, 27, 28, 33, 34, 39, 41, 42, 44, 48, 50, 51, 58, 72, 85, 86, 87, 88, 98, 100, 110, and 127, 135, 141, 142, 144, the C.I. direct oranges 6, 8, 10, 26, 29, 39, 41, 49, 51, 62, and 102, the C.I. direct red 1, 2, 4, 8, 9, 11, 13, 15, 17, 20, 23, 24, 28, 31, 33, 37, and 39, 44, 46, 47, 48, 51, 59, 62, 63, 73, 75, 77, 79, 80, 81, 83, 84, 85, 87, 89, 90, 94, 95, 99, 101, 108, 110, 145, 189, 197, 224, 225, 226, 227, 230, 250, 256, 257, the C.I. direct violet 1, 7, 9, 12, 35, 48, 51, 90, and 94, the C.I. direct blues 1, 2, 6, 8, 12, 15, 22, 25, 34, 69, 70, 71, 72, 75, 76, 78, 80, 81, 82, 83, 86, 87, and 90, 98, 106, 108, 110, 120, 123, 158, 163, 165, 192, 193, 194, 195, 196, 199, 200, 201, 202, 203, 207, 218, 236, 237, 239, 246, 258, 287, C. The I. direct greens 1, 6, 8, 28, 33, 37, 63, and 64, C.I. direct Brown 1A, 2, 6, 25, 27, 44, 58, 95, 100, 101, 106, 112, 173, 194, 195, 209, 210, 211, the acid-dye C.I. acid blacks 1, 2, 7, 16, 17, 24, 26, 28, 31, 41, 48, 52, 58, 60, 63, and 94, 107, 109, 112, 118, 119, 121, 122, 131, 155, 156, the C.I. acid yellow 1, 3, 4, 7, 11, 12, 13, 14, 17, 18, 19, 23, 25, 29, 34, 36, 38, 40, 41, 42, 44, 49, 53, and 55, 59, 61, 71, 72, 76, 78, 79, 99, 111, 114, 116, 122, 135, 142, 161, 172, the C.I. acid oranges 7, 8, 10, 19, 20, 24, 28, 33, 41, 45, 51, 56, and 64, the C.I. acid reds 1 and 4, 6, 8, 13, 14, 15, 18, 19, 21, 26, 27, 30, 32, 34, 35, 37, 40, 42, 44, 51, 52, 54, 57, 80, 82, 83, 85, 87, 88, 89, 92, 94, 97, 106, 108, 110, 111, 114, 115, 119, 129, 131, 134, 135, 143, 144, 152, 154, 155, 172, 176, 180, 184, 186, 187, 249, 254, 256, 289, 317, 318, the C.I. acid violet 7, 11, 15, 34, 35, and 41, 43, 49, 51, 75, the C.I. acid blues 1, 7, 9, 15, 22, 23, 25, 27, 29, 40, 41, 43, 45, 51, 53, 55, 56, 59, 62, 78, 80, 81, 83, 90, 92, 93, 102, 104, 111, 113, and 117, 120, 124, 126, 138, 145, 167, 171, 175, 183, 229, 234, 236, 249, the C.I. acid greens 3, 9, 12, 16, 19, 20, 25, 27, 41, and 44, C.I. acid Brown 4 and 14, The basic dye C.I. basic blacks 2 and 8, the C.I. basic yellow 1, 2, 11, 14, 21, 32, and 36, the C.I. basic oranges 2, 15, 21, and 22, the C.I. basic red 1, 2, 9, 12, 13, and 37, C. The I. basic violet 1, 3, 7, 10, and 14, the C.I. basic blues 1, 3, 5, 7, 9, 24, 25, 26, 28, and 29, the C.I. basic greens 1 and 4, C.I. basic Brown 1 and 12, reactive-dye C.I. reactive black 1, 3, 5, 6, 8, 12, 14, the C.I. reactive yellow 1, 2, 3, 12, 13, 14, 15, and 17, the C.I. reactive oranges 2, 5, 7, 16, 20, and 24, the C.I. reactive red 6, 7, 11, 12, 15, 17, 21, 23, 24, and 35, 36, 42, 63, 66, 84, 184, the C.I. reactive violet 2, 4, 5, 8, and 9, the C.I. reactive blues 2, 5, 7, 12, 13, 14, 15, 17, 18, 19, 20, 21, 25, 27, 28, 37, 38, 40, and 41, C. The I. reactive greens 5 and 7, C.I. reactive Brown 1, 7, and 16, the food-dye C.I. hood blacks 1 and 2, the C.I. hood yellow 3, 4, and 5, C.I. hood red 2, 3, 7, 9, 14, 52, 87, 92, 94, 102, 104, and 105, There are 106, the C.I. hood violet 2, the C.I. hood blues 1 and 2, C.I. hood greens 2 and 3, etc.

[0016] As other colors, it is kaya set black by Nippon Kayaku Co., Ltd. 009A. Direct deep black XA, The direct special black AXN, the vice-crypt black SP liquid by the Beyer company, liver cell TAKOISU -- blue -- KS-6GLL, PIRANIN, and the Sumitomo Chemical Co., Ltd. make -- JI.BK-2, JI.BK-3, JPK[by the Orient chemistry company]-81L, and JPX-127L -- JPK-139, the C.I. flow SENTOBU Lightning agents 14, 22, 24, 32, 84, 85, 86, 87, 90, 134, 166, 167, 169, 175, 176, and 177, etc. are mentioned.

[0017] In addition, have water and compatibility and the solubility of a soluble low solvent (B) with water and a color (A) is raised. As what can be used in order to raise the permeability over the recorded body, for example, paper, furthermore or to prevent the blinding of a nozzle The alkyl alcohols of the carbon numbers 1-4, such as ethanol, a methanol, a butanol, propanol, and an isopropanol Ethylene glycol, a diethylene glycol, a triethylene glycol, A with a molecular weight of 600 or less polyethylene glycol, 1, 3-butylene glycol, Polyhydric alcohol or glycols, such as a glycerol, meso erythritol, and a pentaerythritol, An ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, An ethylene glycol monobutyl ether, ethylene-glycol-monomethyl-ether acetate, The diethylene-glycol monomethyl ether, a diethylene glycol monoethyl ether, The diethylene-glycol monochrome-n-propyl ether, the ethylene glycol monochrome-iso-propyl ether, The diethylene-glycol monochrome-iso-propyl ether, an ethylene glycol monochrome-n-butyl ether, A diethylene-glycol monochrome-n-butyl ether, an ethylene glycol monochrome-t-butyl ether, A diethylene-glycol monochrome-t-butyl ether, the triethylene-glycol monobutyl ether, 1-methyl-1-methoxybutanol, a propylene glycol monomethyl ether, The propylene-glycol monoethyl ether, a propylene-glycol monochrome-t-butyl ether, The propylene-glycol monochrome-n-propyl ether, the propylene-glycol monochrome-iso-propyl ether, The

dipropylene-glycol monomethyl ether, the dipropylene-glycol monoethyl ether, Glycol ethers, such as the dipropylene-glycol monochrome-n-propyl ether and the dipropylene-glycol monochrome-iso-propyl ether A formamide, an acetamide, dimethyl sulfoxide, a sorbitol, There are sorbitan, a glyceryl monoacetate, a diacetin, a triacetin, a sulfolane, etc., these can be used, choosing them suitably, to the ink whole quantity, 5 to 60 % of the weight of the amount used is desirable, and it needs to add the amount of the grade from which (B) to add does not start phase separation in ordinary temperature. This propylene-glycol monochrome-n-butyl ether as (B) and a dipropylene-glycol monochrome-n-butyl ether have the insufficient permeability of less than 3 % of the weight, and since the above-mentioned water-soluble organic solvent will be so much needed and the viscosity of ink will rise in order to become easy to start oily phase separation as water color ink and to suppress it if printing bleeds and 30 % of the weight is exceeded, as an object for ink jets, it is not desirable. A more desirable addition is 15 % of the weight from 2 % of the weight.

[0018] Moreover, since permeability is further controlled in this ink system, it is also possible to add other surfactants as a dissolution assistant of (B). The surfactant to add has the good desirable surfactant of compatibility with the ink system shown in this example, and what has it is good. [high permeability and stable in a surfactant,] As the example, an amphoteric surface active agent, a nonionic surface active agent, etc. are raised. As an amphoteric surface active agent, there are lauryldimethyl betaine aminoacetate, 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine, a palm-oil-fatty-acid amide propyl dimethylamino acetic-acid betaine, another poliomyelitis KUCHIRUPORI aminoethyl glycine and imidazoline derivative, etc. As a nonionic surface active agent, the polyoxyethylene nonylphenyl ether, A polyoxyethylene octyl phenyl ether, a polyoxyethylene dodecyl phenyl ether, Polyoxyethylene alkyl aryl ether, the polyoxyethylene oleyl ether, The polyoxyethylene lauryl ether, polyoxyethylene alkyl ether, Ether systems, such as polyoxyalkylene alkyl ether, polyoxyethylene oleic acid, A polyoxyethylene oleate, polyoxyethylene distearic acid ester, Sorbitan laurate, sorbitan monostearate, sorbitan monooleate, There are fluorine-containing ** surfactants, such as ester systems, such as sorbitansesquiolate, polyoxyethylene monooleate, and polyoxyethylene stearate, other fluorine alkyl ester, and a perfluoroalkyl carboxylate, etc.

[0019] Moreover, you may add sodium-benzoate, pentachlorophenol sodium, 2-pyridine thiol-1-oxide sodium, sodium-sorbate, sodium-dehydroacetate, 1, and 2-JIBENJISO thiazoline-3-ON (pro cheating-on-the-fare XL- the pro cheating on the fare CRL of ICI, the pro cheating on the fare BDN, the pro cheating on the fare GXL, 2, pro cheating on the fare TN) etc., for example as antiseptics and an antifungal agent.

[0020] As an antioxidant pH regulator and color dissolution assistant **** again Or a diethanolamine, Amines and those conversion objects, such as a triethanolamine, propanolamine, and a morpholine, Mineral, such as a potassium hydroxide, a sodium hydroxide, and a lithium hydroxide, An ammonium hydroxide, the 4th class ammonium hydroxide (tetramethylammonium etc.), Carbonic acid salts, other phosphate, such as potassium carbonate, a sodium carbonate, and a lithium carbonate, etc., Or ureas, such as a N-methyl-2-pyrrolidone, a urea, thiourea, and a tetramethylurea Aloha, burets, such as aloha shirt NETO, such as NETO and methyl aloha shirt NETO, a buret, a dimethyl buret, and a tetramethyl buret, have L ascorbic acid, its salt, etc. Moreover, a commercial antioxidant, an ultraviolet ray absorbent, etc. can be used. As the example, there are Tinuvin 328, 900, 1130, 384, 292, 123, 144, 622, 770, and 292 of Ciba-Geigy, Irgacor 252 and 153, Irganox 1010, 1076, and 1035, MD1024, etc.

[0021] Furthermore, as a viscosity controlling agent, there are rosin, alginic acids, polyvinyl alcohol, hydroxypropylcellulose, a carboxymethyl cellulose, a hydroxyethyl cellulose, a methyl cellulose, a polyacrylate, a polyvinyl pyrrolidone, gum arabic starch, etc.

[0022]

[Example] Next, the concrete example and the example of comparison which become the main point of this invention and which create the ink for ink jets using the (A) water soluble dye, (B) propylene-glycol monobutyl ether and/or the dipropylene-glycol monobutyl ether, (C) acetylene glycol system surfactant, and (D) water are shown. in addition, the addition in an example -- weight % -- it is -- the inside of the water of a residue -- the corrosion prevention of ink sake -

- pro cheating-on-the-fare XL-2 — 1% of weights from 0.1, and an ink-jet head — the benzotriazol was added 0.05% of the weight from 0.001 for the corrosion prevention of a member Moreover, as an acetylene glycol system surfactant of (4), acetylene glycol systems (for example, Nissin Chemical SAFI Norians 104 and 82,465,485 or TG etc.), such as all [5-dimethyl-1-hexyne-3 / 2, 4, 7, the 9-tetramethyl-5-crepe de Chine -4, 7-diol, 3, the 6-dimethyl-4-octyne -3, 6-diol, 3, and], were used.

[0023]

An example 1 The addition CI direct black 19 2.0PGmBE(s) 7.0DEGmBE(s) 7. 01, 4-butanediol 5. 01, 6-hexandiol A 5.02-pyrrolidone 2.0 thiodiglycols 3.0 SAFI Norian 104 1.0 ion exchange water Residue example 2CI hood black 2 2.0DPGmBE(s) 5.0TEGmBE(s) 10.0 dipropylene glycols 5.0 tripropylene glycol 5.0 ureas 5.0 SAFI Norian TG 1.2 fluorochemical surfactants 0.1 ion exchange water Residue example 3CI basic yellow 11.5PGmBE 5.0MMB 10.0 propylene glycols 7.0 triethylene glycols 3. 01, 5-pentanediol 5.0 SAFI Norian TG 1.4 ion-exchange-water residue example 4 special black SP liquid 3.0DPGmBE 5.0PGmEE(s) 10.01, 6-hexandiol 5.0 tripropylene glycol 2.0DMI 2.0 SAFI Norian 104 0.8 SAFI Norian 465 0.4 ion exchange water Residue example 5 direct blue 199 3.0PGmBE(s) 5.0DPGmME 10.0MPD 3.0 trimethylol propanes 3.0N-methyl pyrrolidone 3.0 SAFI Norian TG 1.2 ion exchange water Residue example 6CI reactive red 6 2.5PGmBE 5.0DPGmBE(s) 2.0DEGmBE 10.0 neopentyl glycol 5.0 diethylene glycols 5.0 SAFI Norian TG 0.5 SAIFINORU 104 0.5 ion exchange water The residue example 7CI acid green 9 3.0DPGmBE(s) 5.0TEGmBE 10.0 glycerol 5.0 trimethylol-propane 5.0 trimethylolethane PEG of 5.0 number average molecular weight 400 2.0 SAFI Norian 465 1.0 SAFI Norian TG 0.6 triethanolamines 0.1 ion exchange water Residue example 8CI direct green 1 1.5CI direct green 281.0DPGmBE 5.0DEGmtBE(s) 5.0DEGmBE 5.0 diethylene glycols A 5.0 tetrapropylene glycol 5. 01, 3-propanediol 5.0 SAFI Norian 104 1.0 ion exchange water Example of residue comparison 1CI direct green 1 2.0DEGmBE 10.0 ethylene glycol 8.0 potassium hydroxides 0.1 ion exchange water The example of residue comparison 2CI direct red 227 2.5DEGmBE(s) 10.0 diethylene glycols 10.0 glycerols 5.0 ion exchange water Example of residue comparison 3CI acid red 254 2.5DEGmBE 10.0 diethylene glycols 10.0 SAFI Norian 465 1.0 ion exchange water A residue PGmBE A propylene-glycol monochrome-n-butyl ether, A diethylene-glycol monochrome-n-butyl ether and DPGmBE DEGmBE A dipropylene-glycol monochrome-n-butyl ether, TEGmBE A triethylene-glycol monochrome-n-butyl ether, 1-methyl-1-methoxybutanol and PGmEE MMB The propylene-glycol monoethyl ether, In DMI, 1, 3-dimethyl-2-imidazolidinone, and DPGmME MPD for the dipropylene-glycol monomethyl ether The 2-methyl -2, 4-pentanediol, PEG is a polyethylene glycol and DEGmtBE is a diethylene-glycol monochrome-t-butyl ether. It is shown, respectively.

[0024] Next, the result when performing printing evaluation using the ink for ink-jet record created by the method of becoming this invention shown in these examples and the example of comparison is shown in Table 1. in Table 1, bleeding reduces the roundness of a dot — detailed — the unevenness of what osmosis is shown and the mustache shows the unevenness of the linear osmosis extended in the shape of a stripe along with the fiber of paper the sign shown in Table 1 — O — very good O — good ** — bad x -- a very bad thing is shown In addition, ink jet printer MJ-700V2C by SEIKO EPSON incorporated company performed measurement of this printing evaluation.

[0025]

[Table 1]

印字評価結果

試験項目	紙の種類	実施例								比較例		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	Conqueror紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	Favorit紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	Modo Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Rapid Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Xerox P紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Xerox 4024紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	Xerox 10紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	Neenha Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	Ricopy 6200紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	やまゆり紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	Xerox R紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
ヒゲ	Conqueror紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Favorit紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	Modo Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	Rapid Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	Xerox P紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Xerox 4024紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	Ricopy 6200紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	やまゆり紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	Xerox R紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×

[0026] By using the ink for ink-jet record which becomes this invention, neither bleeding nor a mustache is in almost all papers so that the result of Table 1 may show, and it turns out also especially to recycled paper that good printing is possible. Although this is realizable for the first time with the combination of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, and the surfactant of an acetylene glycol system, since it sees and water solubility cannot be then secured, when [these] using a water soluble dye, it is surely needed, water-soluble solvent, for example, water-soluble glycol ether. Therefore, this invention shows that it was realizable for the first time with such combination by being characterized by including the (A) water soluble dye, a (B) propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, (C) acetylene glycol system surfactant, and (D) water at least.

[0027] Next, it explains that it is required for the whole less than 20-time hidden 0.3 or more time ink of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether to contain a water-soluble glycol ether 40% or less as a component of the above-mentioned ink for ink-jet record. Although the amount of a propylene-glycol monochrome-n-butyl ether does not become a problem so much in 2 or less % of the weight of ink, if it exceeds about 1 % of the weight, by the dipropylene-glycol monochrome-n-butyl ether, other ink components will carry out phase separation to ****** exceeding 2 % of the weight also in ordinary temperature. Above 40 degrees C, it further becomes easy to carry out phase separation. Therefore, a water-soluble glycol ether with an amount [of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether] of 0.3 or more times is required. moreover, in the water-soluble glycol ether which exceeds 20 times of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, or exceeds 40% of the weight of the amount of the whole ink, when dryness of ink takes time and printing becomes easy to bleed, there is an inclination acquired and said Therefore, this addition is 20 or less times, and it is necessary to make it into 40 or less % of the weight of the ink whole quantity.

[0028] Moreover, when 30 was exceeded, since there was much foaming, the inclination to take time in foam inhibition or for printing to become unstable with the bubble came out of HLB in 15 degrees C of the surfactant of the acetylene glycol system in this invention. Therefore, it is necessary to add HLB so that it may become 30 or less in 15 degrees C. However, since the real service temperature of the ink for ink-jet record is 5 degrees C to about 40 degrees C, it is needed by the temperature requirement that whippability is low, and it is necessary to make it phase separation phenomena, such as a cloudy point, not produce it.

[0029] Furthermore, the result when changing surface tension by composition of an example 1 is explained. The kind and concentration of a surfactant were changed into the composition except the surfactant of the ink of composition of an example 1, and it added to it, it blended so that surface tension might fall, and by the composition which carried out little addition of the diethylene-glycol monochrome-n-butyl ether, it blended with the composition except the surfactant of the ink of composition of an example 1, and the propylene-glycol-n-butyl ether so that surface tension might rise. Consequently, if the surface tension of the ink for ink-jet record used by this example is not 15 or more mN/m, it will become difficult to hold ink in the front face of a nozzle, and the dot omission of printing will become easy to produce it. Moreover, when 40 mN/m was surpassed, it turns out that the osmosis speed to the paper of printing becomes slow, it becomes easy to bleed in the paper which cannot permeate easily, and there is an inclination for a quality of printed character to deteriorate. Therefore, surface tension needs to be 15 or more mN/m 40 or less mN/m.

[0030] Moreover, stable printing was possible by using the mechanism in which the viscosity of the ink for ink-jet record which becomes this invention breathes out and twists ink in ordinary temperature so that solvents, such as moisture of the ink at the nose of cam of a nozzle, may dry at the time of 3 or more mPa-s and poor **** may not be produced, the ink sometimes breathes out and twists, and it vibrates like. In especially less than 3 mPa-s, even if this did not establish such a mechanism, it was satisfactory. However, in this invention, since ink permeates a record medium-ed promptly, it is in the inclination whose addition of a color increases, therefore viscosity also comes to exceed 3 mPa-s in many cases. Therefore, it is necessary for the ink for ink-jet record which becomes this invention to use this mechanism.

[0031] Furthermore, from the conventional example, ink adheres to the front face of a nozzle, and the ink for ink-jet record which becomes this invention tended to produce disorder of printing. Since it was prevented, the problem was solvable by adding a fluorochemical surfactant, as shown in an example 2. an addition -- 1PPM or more 10000PPM or less of the amount of ink -- adding -- if -- being good . When the effect that this addition suppresses printing disorder in less than 1PPM was low and exceeded 10000PPM, foaming became intense and there was an inclination which takes time in foam inhibition, or the surface tension of ink declines and produces a dot omission. Therefore, it is necessary for the amount of ink to add 1PPM or more 10000PPM or less of fluorochemical surfactants. In the example shown by this invention, other

same systems which took in the main point of this invention are effective of this effect from the first.

[0032] Next, since the ink for ink-jet record which becomes this invention contains the low acetylene glycol system surfactant of the soluble low propylene-glycol monochrome-n-butyl ether and/or dipropylene-glycol monochrome-n-butyl ether to water, or HLB, it tends to start phase separation in an elevated temperature. Therefore, in order to prevent this, it found out that it was good to include glycols, such as a thiodiglycol, 25 or less % of the weight more than 3% weight. At less than 3%, if phase separation depressor effect is low and exceeds 25 % of the weight, viscosity will increase and the evil of the addition of a color or other additives being restricted will come out. Moreover, by including glycols, such as this thiodiglycol, showed that poor printing by dryness in the front face of a nozzle of ink was reduced. a simple substance, mixture, etc., such as 1, 4-butanediol, 1,5-pentanediol, 1, 6-hexandiol, a propylene glycol, a dipropylene glycol, tripropylene glycol, neopentyl glycol, the 2-methyl -2, 4 pentanediol, a trimethylol propane, and trimethylolethane, had such an effect other than a thiodiglycol as a certain thing

[0033] In order to take out practicality from the above thing based on improvement in qualities of printed character, such as bleeding, mustached reduction, etc. to record media-ed, such as paper, by the combination of a propylene-glycol-n-butyl ether, a dipropylene-glycol-n-butyl ether, and an acetylene glycol system surfactant. Suppression of the phase separation by the water-soluble glycol ether, the addition of the surfactant of an acetylene glucohol system and a limit of HLB, a convention of surface tension, adoption of the shaker style of the ink in the nose of cam of a nozzle, reduction of the printing disorder by the fluorochemical surfactant, reduction of the printing disorder by dryness of the ink in the phase separation and the nozzle nose of cam by addition of glycols, etc. show that the high ink for ink-jet record of practicality is made.

[0034] In addition, various change is possible, unless it should not think that this invention is limited to these examples but deviates from the main point of this invention.

[0035]

[Effect of the Invention] According to this invention, it has the effect of offering the ink for ink-jet record in which printing which hardly spreads to the conventionally inadequate regular paper, especially the recycled paper used abundantly by the environmental problem etc. in recent years described above is possible, like. Moreover, in order that ink may not carry out phase separation in an elevated temperature, it is stable, and since intermittent printable time can also be lengthened, the futility of ink also has the effect that the throughput of printing can be raised few.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] this invention relates to the ink for ink-jet record in which a high quality of printed character is obtained to a regular paper, recycled paper, coat paper, or an OHP form.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Ink-jet record is the method of injecting ink as a globule from a detailed nozzle, and recording a character and a figure on a recorded body surface. An electrical signal is changed into a machine signal, using an electrostriction element as an ink-jet recording method. The ink stored in the nozzle head portion is injected continuously or intermittently, and the part very near an injection portion is quickly heated for the method of recording a character and a sign on a recorded body surface, and the ink stored in the nozzle head portion, a bubble is generated, it injects continuously or intermittently, and the method of recording a character and a sign on a recorded body surface etc. is put in practical use.
[0003] Properties, like that there is no bleeding of that the drying property of printing is good or printing in the ink used for such ink-jet record and it is uniformly printable to all recorded body surfaces are demanded. Here, I hear that it is easy to produce generating of bleeding by the fiber from which the permeability is different, and it is to become especially a problem, when paper is used as the recorded body.
[0004] There were many water-soluble organic solvents or examples which were used as a color dissolution accelerator like JP,2-3837,B like JP,1-15542,B in using a glycol ether as a wetting agent like JP,2-2907,B in the conventional ink for ink-jet record.
[0005] Moreover, in order to raise permeability, SAFI Norian 465 which is the surfactant of an acetylene glycol system like a U.S. Pat. No. 5183502 specification in adding the diethylene-glycol monobutyl ether like a U.S. Pat. No. 5156675 specification is added, or adding both the diethylene-glycol monobutyl ether and SAFI Norian 465 like a U.S. Pat. No. 5196056 specification etc. is examined. From the first, a diethylene-glycol monochrome-n-butyl ether is called butyl carbitol, for example, is indicated by the U.S. Pat. No. 3291580 specification. Or using the ether of a diethylene glycol for ink is examined by the U.S. Pat. No. 2083372 specification.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, it has the effect of offering the ink for ink-jet record in which printing which hardly spreads to the conventionally inadequate regular paper, especially the recycled paper used abundantly by the environmental problem etc. in recent years described above is possible, like. Moreover, in order that ink may not carry out phase separation in an elevated temperature, it is stable, and since intermittent printable time can also be lengthened, the futility of ink also has the effect that the throughput of printing can be raised few.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, it had the technical problem that the permeability of a Prior art will be inadequate and it will spread to the recycled paper used abundantly by the environmental problem etc. a regular paper, especially in recent years. The component of various papers is mixed, and although the osmosis speed differs, since recycled paper is the aggregate, it tends to bleed according to the difference of those osmosis speed. In order to reduce the bleeding, while printing generally, the method which heats paper is examined. However, when printing and paper etc. is heated, the technical problem that rising to the predetermined temperature of the heating unit in equipment takes time, the power consumption of the main part of equipment becomes large, or a damage is given to the printed object of paper and others occurs.

[0007] Then, this invention solves such a technical problem, and the place made into the purpose has very quick permeability, and is located in the place which says that printing which hardly spreads even if it does not establish especially a heating means to the recycled paper used abundantly by the environmental problem etc. a regular paper, especially in recent years is possible.

[Translation done.]

MEANS

[Means for Solving the Problem] It is characterized by the ink for ink-jet record of this invention containing the (A) water soluble dye, (B) propylene-glycol monobutyl ether and/or the dipropylene-glycol monobutyl ether, (C) acetylene series surfactant, and (D) water at least.
[0009] this invention is based on the result examined wholeheartedly in view of properties, like that there is no bleeding of that the drying property of printing is good or printing in the ink used for ink-jet record and it is uniformly printable to all recorded body surfaces being demanded.
[0010] In this invention, the addition of (B) propylene-glycol monobutyl ether of a claim 1 and/or the dipropylene-glycol monobutyl ether has a direction near 10 % of the weight in the inclination whose bleeding of printing decreases. In this case, even if it is dissolving in ordinary temperature by the water-soluble glycol ether etc., for example at 40 degrees C, (B) propylene-glycol monobutyl ether of this claim 1 and/or a dipropylene-glycol monobutyl ether component carry out phase separation to the (A) color or the water component of (D). In order to suppress this, using glycols wholeheartedly as a result of examination found out the good thing. Although viscosity printable [with this ink-jet method] cannot generally be said since it changes by the addition of additives, such as other glycols, and a color, or the ****** type of ink, it is desirable to add so that the viscosity of ink may become less than 10 mPa-s by the real service temperature (15 degrees C - 40 degrees C) of a printer.
[0011] In this invention, when blending the (A) water soluble dye, (B) propylene-glycol monobutyl ether and/or the dipropylene-glycol monobutyl ether, (C) acetylene glycol system surfactant, and (D) water and making ink, additives, such as antiseptics, an antioxidant, a conductivity regulator, pH regulator, a viscosity controlling agent, a surface tension regulator, an oxygen absorbent, and a blinding inhibitor of a nozzle, can be suitably used as the component.
[0012] It is required for the whole less than 20-time hidden 0.3 or more time ink of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether to contain a water-soluble glycol ether 40% or less as a component of the above-mentioned ink for ink jets. Although the amount of a propylene-glycol monochrome-n-butyl ether does not become a problem so much in 2% or less of ink, if about 1% is exceeded in a dipropylene-glycol monochrome-n-butyl ether, other ink components will carry out phase separation to ****** exceeding 2% also in ordinary temperature. Above 40 degrees C, it further becomes easy to carry out phase separation. Therefore, a water-soluble glycol ether with an amount [of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether] of 0.3 or more times is needed. moreover, by the water-soluble organic solvent which exceeds 20 times of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, or exceeds 60% of the amount of the whole ink, when dryness of ink takes time and printing becomes easy to bleed, there is an inclination acquired and said Therefore, this is 20 or less times, and it is necessary to make it into 60% or less of the ink whole quantity.
[0013] The concentration of the above-mentioned acetylene glycol system surfactant is ineffective in less than 10PPM, and since it does not accept, it is necessary to add 10PPM or more of improvement in a quality of printed character. Moreover, since it becomes, or is easy to deposit, it becomes that it will be easy to foam if 10000PPM is exceeded and stable printing

becomes impossible, it is necessary to be 10000PPM or less.
[0014] If it will become difficult to hold ink in the front face of a nozzle if it is not 15 or more mN/m, and it becomes easy to produce the dot omission of printing and the surface tension of the above-mentioned ink for ink-jet record surpasses 40 mN/m, the osmosis speed to the paper of printing becomes slow, in the paper which cannot permeate easily, it becomes easy to bleed and a quality of printed character will deteriorate. Therefore, surface tension needs to be 15 or more mN/m 40 or less mN/m.
[0015] As a color which is (A), there are direct dye, acid dye, basic dye, a reactive dye, a food dye, etc. The C.I. name of a water soluble dye Use, and when shown, the direct dye C.I. direct blacks 2, 4, 9, 11, 14, 17, 19, 22, 27, 32, 36, 41, 48, 51, 56, 62, 71, 74, 75, 77, 78, 80, 105, 106, 107, 108, 112, 113, 117, and 132, 146, 154, 168, 171, 194, the C.I. direct yellow 1, 2, 4, 8, 11, 12, 24, 26, 27, 28, 33, 34, 39, 41, 42, 44, 48, 50, 51, 58, 72, 85, 86, 87, 88, 98, 100, 110, and 127, 135, 141, 142, 144, the C.I. direct oranges 6, 8, 10, 26, 29, 39, 41, 49, 51, 62, and 102, the C.I. direct red 1, 2, 4, 8, 9, 11, 13, 15, 17, 20, 23, 24, 28, 31, 33, 37, and 39, 44, 46, 47, 48, 51, 59, 62, 63, 73, 75, 77, 79, 80, 81, 83, 84, 85, 87, 89, 90, 94, 95, 99, 101, 108, 110, 145, 189, 197, 224, 225, 226, 227, 230, 250, 256, 257, the C.I. direct violet 1, 7, 9, 12, 35, 48, 51, 90, and 94, the C.I. direct blues 1, 2, 6, 8, 12, 15, 22, 25, 34, 69, 70, 71, 72, 75, 76, 78, 80, 81, 82, 83, 86, 87, and 90, 98, 106, 108, 110, 120, 123, 158, 163, 165, 192, 193, 194, 195, 196, 199, 200, 201, 202, 203, 207, 218, 236, 237, 239, 246, 258, 287, C. The I. direct greens 1, 6, 8, 28, 33, 37, 63, and 64, C.I. direct Brown 1A, 2, 6, 25, 27, 44, 58, 95, 100, 101, 106, 112, 173, 194, 195, 209, 210, 211, the acid-dye C.I. acid blacks 1, 2, 7, 16, 17, 24, 26, 28, 31, 41, 48, 52, 58, 60, 63, and 94, 107, 109, 112, 118, 119, 121, 122, 131, 155, 156, the C.I. acid yellow 1, 3, 4, 7, 11, 12, 13, 14, 17, 18, 19, 23, 25, 29, 34, 36, 38, 40, 41, 42, 44, 49, 53, and 55, 59, 61, 71, 72, 76, 78, 79, 99, 111, 114, 116, 122, 135, 142, 161, 172, the C.I. acid oranges 7, 8, 10, 19, 20, 24, 28, 33, 41, 45, 51, 56, and 64, the C.I. acid red 1 and 4, 6, 8, 13, 14, 15, 18, 19, 21, 26, 27, 30, 32, 34, 35, 37, 40, 42, 44, 51, 52, 54, 57, 80, 82, 83, 85, 87, 88, 89, 92, 94, 97, 106, 108, 110, 111, 114, 115, 119, 129, 131, 134, 135, 143, 144, 152, 154, 155, 172, 176, 180, 184, 186, 187, 249, 254, 256, 289, 317, 318, the C.I. acid violet 7, 11, 15, 34, 35, and 41, 43, 49, 51, 75, the C.I. acid blues 1, 7, 9, 15, 22, 23, 25, 27, 29, 40, 41, 43, 45, 51, 53, 55, 56, 59, 62, 78, 80, 81, 83, 90, 92, 93, 102, 104, 111, 113, and 117, 120, 124, 126, 138, 145, 167, 171, 175, 183, 229, 234, 236, 249, the C.I. acid greens 3, 9, 12, 16, 19, 20, 25, 27, 41, and 44, C.I. acid Brown 4 and 14, The basic dye C.I. basic blacks 2 and 8, the C.I. basic yellow 1, 2, 11, 14, 21, 32, and 36, the C.I. basic oranges 2, 15, 21, and 22, the C.I. basic red 1, 2, 9, 12, 13, and 37, C. The I. basic violet 1, 3, 7, 10, and 14, the C.I. basic blues 1, 3, 5, 7, 9, 24, 25, 26, 28, and 29, the C.I. basic greens 1 and 4, C.I. basic Brown 1 and 12, reactive-dye C.I. reactive black 1, 3, 5, 6, 8, 12, 14, the C.I. reactive yellow 1, 2, 3, 12, 13, 14, 15, and 17, the C.I. reactive oranges 2, 5, 7, 16, 20, and 24, the C.I. reactive red 6, 7, 11, 12, 15, 17, 21, 23, 24, and 35, 36, 42, 63, 66, 84, 184, the C.I. reactive violet 2, 4, 5, 8, and 9, the C.I. reactive blues 2, 5, 7, 12, 13, 14, 15, 17, 18, 19, 20, 21, 25, 27, 28, 37, 38, 40, and 41, C. The I. reactive greens 5 and 7, C.I. reactive Brown 1, 7, and 16, the food-dye C.I. hood blacks 1 and 2, the C.I. hood yellow 3, 4, and 5, C.I. hood red 2, 3, 7, 9, 14, 52, 87, 92, 94, 102, 104, and 105, There are 106, the C.I. hood violet 2, the C.I. hood blues 1 and 2, C.I. hood greens 2 and 3, etc.
[0016] As other colors, it is kaya set black by Nippon Kayaku Co., Ltd. 009A. Direct deep black XA, The direct special black AXN, the vice-crypt black SP liquid by the Beyer company, liver cell TAKOISU — blue — KS-6GLL, PIRANIN, and the Sumitomo Chemical Co., Ltd. make — JI.BK-2, JI.BK-3, JPK[by the Orient chemistry company]-81L, and JPX-127L — JPK-139, the C.I. flow SENTOBU Lightning agents 14, 22, 24, 32, 84, 85, 86, 87, 90, 134, 166, 167, 169, 175, 176, and 177, etc. are mentioned.
[0017] In addition, have water and compatibility and the solubility of a soluble low solvent (B) with water and a color (A) is raised. As what can be used in order to raise the permeability over the recorded body, for example, paper, furthermore or to prevent the blinding of a nozzle The alkyl alcohols of the carbon numbers 1-4, such as ethanol, a methanol, a butanol, propanol, and an isopropanol Ethylene glycol, a diethylene glycol, a triethylene glycol, A with a molecular weight of 600 or less polyethylene glycol, 1, 3-butylene glycol, Polyhydric alcohol or glycols, such as a glycerol, meso erythritol, and a pentaerythritol, An ethylene glycol monomethyl ether, ethylene

glycol monoethyl ether, An ethylene glycol monobutyl ether, ethylene-glycol-monomethyl-ether acetate, The diethylene-glycol monomethyl ether, a diethylene glycol monoethyl ether, The diethylene-glycol monochrome-n-propyl ether, the ethylene glycol monochrome-iso-propyl ether, The diethylene-glycol monochrome-iso-propyl ether, an ethylene glycol monochrome-n-butyl ether, A diethylene-glycol monochrome-n-butyl ether, an ethylene glycol monochrome-t-butyl ether, A diethylene-glycol monochrome-t-butyl ether, the triethylene-glycol monobutyl ether, 1-methyl-1-methoxybutanol, a propylene glycol monomethyl ether, The propylene-glycol monoethyl ether, a propylene-glycol monochrome-t-butyl ether, The propylene-glycol monochrome-n-propyl ether, the propylene-glycol monochrome-iso-propyl ether, The dipropylene-glycol monomethyl ether, the dipropylene-glycol monoethyl ether, Glycol ethers, such as the dipropylene-glycol monochrome-n-propyl ether and the dipropylene-glycol monochrome-iso-propyl ether A formamide, an acetamide, dimethyl sulfoxide, a sorbitol, There are sorbitan, a glyceryl monoacetate, a diacetin, a triacetin, a sulfolane, etc., these can be used, choosing them suitably, to the ink whole quantity, 5 to 60 % of the weight of the amount used is desirable, and it needs to add the amount of the grade from which (B) to add does not start phase separation in ordinary temperature. This propylene-glycol monochrome-n-butyl ether as (B) and a dipropylene-glycol monochrome-n-butyl ether have the insufficient permeability of less than 3 % of the weight, and since the above-mentioned water-soluble organic solvent will be so much needed and the viscosity of ink will rise in order to become easy to start oily phase separation as water color ink and to suppress it if printing bleeds and 30 % of the weight is exceeded, as an object for ink jets, it is not desirable. A more desirable addition is 15 % of the weight from 2 % of the weight.

[0018] Moreover, since permeability is further controlled in this ink system, it is also possible to add other surfactants as a dissolution assistant of (B). The surfactant to add has the good desirable surfactant of compatibility with the ink system shown in this example, and what has it is good. [high permeability and stable in a surfactant,] As the example, an amphoteric surface active agent, a nonionic surface active agent, etc. are raised. As an amphoteric surface active agent, there are lauryldimethyl betaine aminoacetate, 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine, a palm-oil-fatty-acid amide propyl dimethylamino acetic-acid betaine, another poliomyelitis KUCHIRUPORI aminoethyl glycine and imidazoline derivative, etc. As a nonionic surface active agent, the polyoxyethylene nonylphenyl ether, A polyoxyethylene octyl phenyl ether, a polyoxyethylene dodecyl phenyl ether, Polyoxyethylene alkyl aryl ether, the polyoxyethylene oleyl ether, The polyoxyethylene lauryl ether, polyoxyethylene alkyl ether, Ether systems, such as polyoxyalkylene alkyl ether, polyoxyethylene oleic acid, A polyoxyethylene oleate, polyoxyethylene distearic acid ester, Sorbitan laurate, sorbitan monostearate, sorbitan monooleate, There are fluorine-containing ** surfactants, such as ester systems, such as sorbitansesquiolate, polyoxyethylene monooleate, and polyoxyethylene stearate, other fluorine alkyl ester, and a perfluoroalkyl carboxylate, etc.

[0019] Moreover, you may add sodium-benzoate, pentachlorophenol sodium, 2-pyridine thiol-1-oxide sodium, sodium-sorbate, sodium-dehydroacetate, 1, and 2-JIBENJISO thiazoline-3-ON (pro cheating-on-the-fare XL- the pro cheating on the fare CRL of ICI, the pro cheating on the fare BDN, the pro cheating on the fare GXL, 2, pro cheating on the fare TN) etc., for example as antiseptics and an antifungal agent.

[0020] As an antioxidant pH regulator and color dissolution assistant **** again Or a diethanolamine, Amines and those conversion objects, such as a triethanolamine, propanolamine, and a morpholine, Mineral, such as a potassium hydroxide, a sodium hydroxide, and a lithium hydroxide, An ammonium hydroxide, the 4th class ammonium hydroxide (tetramethylammonium etc.), Carbonic acid salts, other phosphate, such as potassium carbonate, a sodium carbonate, and a lithium carbonate, etc., Or ureas, such as a N-methyl-2-pyrrolidone, a urea, thiourea, and a tetramethylurea Aloha, burets, such as aloha shirt NETO, such as NETO and methyl aloha shirt NETO, a buret, a dimethyl buret, and a tetramethyl buret, have L ascorbic acid, its salt, etc. Moreover, a commercial antioxidant, an ultraviolet ray absorbent, etc. can be used. As the example, there are Tinuvin 328, 900, 1130, 384, 292, 123, 144, 622, 770, and 292 of Ciba-Geigy, Irgacor 252 and 153, Irganox 1010, 1076, and 1035, MD1024, etc.

[0021] Furthermore, as a viscosity controlling agent, there are rosin, alginic acids, polyvinyl alcohol, hydroxypropylcellulose, a carboxymethyl cellulose, a hydroxyethyl cellulose, a methyl cellulose, a polyacrylate, a polyvinyl pyrrolidone, gum arabic starch, etc.

[Translation done.]

EXAMPLE

[Example] Next, the concrete example and the example of comparison which become the main point of this invention and which create the ink for ink jets using the (A) water soluble dye, (B) propylene-glycol monobutyl ether and/or the dipropylene-glycol monobutyl ether, (C) acetylene glycol system surfactant, and (D) water are shown. in addition, the addition in an example -- weight % -- it is -- the inside of the water of a residue -- the corrosion prevention of ink sake -- pro cheating-on-the-fare XL-2 -- 1% of weights from 0.1, and an ink-jet head -- the benzotriazol was added 0.05% of the weight from 0.001 for the corrosion prevention of a member Moreover, as an acetylene glycol system surfactant of (4), acetylene glycol systems (for example, Nissin Chemical SAFI Norians 104 and 82,465,485 or TG etc.), such as all [5-dimethyl-1-hexyne-3 / 2, 4, 7, the 9-tetramethyl-5-crepe de Chine -4, 7-diol, 3, the 6-dimethyl-4-octyne -3, 6-diol, 3, and], were used.
[0023]
An example 1 The addition CI direct black 19 2.0PGmBE(s) 7.0DEGmBE(s) 7. 01, 4-butanediol 5. 01, 6-hexandiol A 5.02-pyrrolidone 2.0 thiodiglycols 3.0 SAFI Norian 104 1.0 ion exchange water Residue example 2CI hood black 2 2.0DPGmBE(s) 5.0TEGmBE(s) 10.0 dipropylene glycols 5.0 tripropylene glycol 5.0 ureas 5.0 SAFI Norian TG 1.2 fluorochemical surfactants 0.1 ion exchange water Residue example 3CI basic yellow 11.5PGmBE 5.0MMB 10.0 propylene glycols 7.0 triethylene glycols 3. 01, 5-pentanediol 5.0 SAFI Norian TG 1.4 ion-exchange-water residue example 4 special black SP liquid 3.0DPGmBE 5.0PGmEE(s) 10.01, 6-hexandiol 5.0 tripropylene glycol 2.0DMI 2.0 SAFI Norian 104 0.8 SAFI Norian 465 0.4 ion exchange water Residue example 5 direct blue 199 3.0PGmBE(s) 5.0DPGmME 10.0MPD 3.0 trimethylol propanes 3.0N-methyl pyrrolidone 3.0 SAFI Norian TG 1.2 ion exchange water Residue example 6CI reactive red 6 2.5PGmBE 5.0DPGmBE(s) 2.0DEGmBE 10.0 neopentyl glycol 5.0 diethylene glycols 5.0 SAFI Norian TG 0.5 SAIFINORU 104 0.5 ion exchange water The residue example 7CI acid green 9 3.0DPGmBE(s) 5.0TEGmBE 10.0 glycerol 5.0 trimethylol-propane 5.0 trimethylolethane PEG of 5.0 number average molecular weight 400 2.0 SAFI Norian 465 1.0 SAFI Norian TG 0.6 triethanolamines 0.1 ion exchange water Residue example 8CI direct green 1 1.5CI direct green 281.0DPGmBE 5.0DEGmtBE(s) 5.0DEGmBE 5.0 diethylene glycols A 5.0 tetrapropylene glycol 5. 01, 3-propanediol 5.0 SAFI Norian 104 1.0 ion exchange water Example of residue comparison 1CI direct green 1 2.0DEGmBE 10.0 ethylene glycol 8.0 potassium hydroxides 0.1 ion exchange water The example of residue comparison 2CI direct red 227 2.5DEGmBE(s) 10.0 diethylene glycols 10.0 glycerols 5.0 ion exchange water Example of residue comparison 3CI acid red 254 2.5DEGmBE 10.0 diethylene glycols 10.0 SAFI Norian 465 1.0 ion exchange water A residue PGmBE A propylene-glycol monochrome-n-butyl ether, A diethylene-glycol monochrome-n-butyl ether and DPGmBE DEGmBE A dipropylene-glycol monochrome-n-butyl ether, TEGmBE A triethylene-glycol monochrome-n-butyl ether, 1-methyl-1-methoxybutanol and PGmEE MMB The propylene-glycol monoethyl ether, In DMI, 1, 3-dimethyl-2-imidazolidinone, and DPGmME MPD for the dipropylene-glycol monomethyl ether The 2-methyl -2, 4-pentanediol, PEG is a polyethylene glycol and DEGmtBE is a diethylene-glycol monochrome-t-butyl ether. It is shown, respectively.
[0024] Next, the result when performing printing evaluation using the ink for ink-jet record

created by the method of becoming this invention shown in these examples and the example of comparison is shown in Table 1. in Table 1, bleeding reduces the roundness of a dot — detailed — the unevenness of what osmosis is shown and the mustache shows the unevenness of the linear osmosis extended in the shape of a stripe along with the fiber of paper the sign shown in Table 1 — O — very good O — good ** — bad x — a very bad thing is shown In addition, ink jet printer MJ-700V2C by SEIKO EPSON incorporated company performed measurement of this printing evaluation.

[0025]

[Table 1]

印字評価結果

試験項目	紙の種類	実施例								比較例		
		1	2	3	4	5	6	7	8	1	2	3
にじみ	Conqueror紙	◎	◎	◎	◎	◎	◎	◎	◎	○	◎	○
	Favorit紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	Modo Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Rapid Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	○
	EPSON EPP紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Xerox P紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Xerox 4024紙	◎	◎	◎	◎	◎	◎	◎	◎	△	○	△
	Xerox 10紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	Neenha Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	Ricopy 6200紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	やまゆり紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	Xerox R紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
ヒゲ	Conqueror紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Favorit紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	Modo Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	△	△	△
	Rapid Copy紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	Xerox P紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	×
	Xerox 4024紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	Ricopy 6200紙	◎	◎	◎	◎	◎	◎	◎	◎	×	△	△
	やまゆり紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×
	Xerox R紙	◎	◎	◎	◎	◎	◎	◎	◎	×	×	×

[0026] By using the ink for ink-jet record which becomes this invention, neither bleeding nor a mustache is in almost all papers so that the result of Table 1 may show, and it turns out also

especially to recycled paper that good printing is possible. Although this is realizable for the first time with the combination of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, and the surfactant of an acetylene glycol system, since it sees and water solubility cannot be then secured, when [these] using a water soluble dye, it is surely needed, water-soluble solvent, for example, water-soluble glycol ether. Therefore, this invention shows that it was realizable for the first time with such combination by being characterized by including the (A) water soluble dye, a (B) propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, (C) acetylene glycol system surfactant, and (D) water at least.

[0027] Next, it explains that it is required for the whole less than 20-time hidden 0.3 or more time ink of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether to contain a water-soluble glycol ether 40% or less as a component of the above-mentioned ink for ink-jet record. Although the amount of a propylene-glycol monochrome-n-butyl ether does not become a problem so much in 2 or less % of the weight of ink, if it exceeds about 1 % of the weight, by the dipropylene-glycol monochrome-n-butyl ether, other ink components will carry out phase separation to ****** exceeding 2 % of the weight also in ordinary temperature. Above 40 degrees C, it further becomes easy to carry out phase separation. Therefore, a water-soluble glycol ether with an amount [of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether] of 0.3 or more times is required. moreover, in the water-soluble glycol ether which exceeds 20 times of the amount of a propylene-glycol monochrome-n-butyl ether and/or a dipropylene-glycol monochrome-n-butyl ether, or exceeds 40% of the weight of the amount of the whole ink, when dryness of ink takes time and printing becomes easy to bleed, there is an inclination acquired and said Therefore, this addition is 20 or less times, and it is necessary to make it into 40 or less % of the weight of the ink whole quantity.

[0028] Moreover, when 30 was exceeded, since there was much foaming, the inclination to take time in foam inhibition or for printing to become unstable with the bubble came out of HLB in 15 degrees C of the surfactant of the acetylene glycol system in this invention. Therefore, it is necessary to add HLB so that it may become 30 or less in 15 degrees C. However, since the real service temperature of the ink for ink-jet record is 5 degrees C to about 40 degrees C, it is needed by the temperature requirement that whippability is low, and it is necessary to make it phase separation phenomena, such as a cloudy point, not produce it.

[0029] Furthermore, the result when changing surface tension by composition of an example 1 is explained. The kind and concentration of a surfactant were changed into the composition except the surfactant of the ink of composition of an example 1, and it added to it, it blended so that surface tension might fall, and by the composition which carried out little addition of the diethylene-glycol monochrome-n-butyl ether, it blended with the composition except the surfactant of the ink of composition of an example 1, and the propylene-glycol-n-butyl ether so that surface tension might rise. Consequently, if the surface tension of the ink for ink-jet record used by this example is not 15 or more mN/m, it will become difficult to hold ink in the front face of a nozzle, and the dot omission of printing will become easy to produce it. Moreover, when 40 mN/m was surpassed, it turns out that the osmosis speed to the paper of printing becomes slow, it becomes easy to bleed in the paper which cannot permeate easily, and there is an inclination for a quality of printed character to deteriorate. Therefore, surface tension needs to be 15 or more mN/m 40 or less mN/m.

[0030] Moreover, stable printing was possible by using the mechanism in which the viscosity of the ink for ink-jet record which becomes this invention breathes out and twists ink in ordinary temperature so that solvents, such as moisture of the ink at the nose of cam of a nozzle, may dry at the time of 3 or more mPa-s and poor **** may not be produced, the ink sometimes breathes out and twists, and it vibrates like. In especially less than 3 mPa-s, even if this did not establish such a mechanism, it was satisfactory. However, in this invention, since ink permeates a record medium-ed promptly, it is in the inclination whose addition of a color increases, therefore viscosity also comes to exceed 3 mPa-s in many cases. Therefore, it is necessary for the ink for ink-jet record which becomes this invention to use this mechanism.

[0031] Furthermore, from the conventional example, ink adheres to the front face of a nozzle, and the ink for ink-jet record which becomes this invention tended to produce disorder of printing. Since it was prevented, the problem was solvable by adding a fluorochemical surfactant, as shown in an example 2. an addition — 1PPM or more 10000PPM or less of the amount of ink — adding — if — being good . When the effect that this addition suppresses printing disorder in less than 1PPM was low and exceeded 10000PPM, foaming became intense and there was an inclination which takes time in foam inhibition, or the surface tension of ink declines and produces a dot omission. Therefore, it is necessary for the amount of ink to add 1PPM or more 10000PPM or less of fluorochemical surfactants. In the example shown by this invention, other same systems which took in the main point of this invention are effective of this effect from the first.

[0032] Next, since the ink for ink-jet record which becomes this invention contains the low acetylene glycol system surfactant of the soluble low propylene-glycol monochrome-n-butyl ether and/or dipropylene-glycol monochrome-n-butyl ether to water, or HLB, it tends to start phase separation in an elevated temperature. Therefore, in order to prevent this, it found out that it was good to include glycols, such as a thiodiglycol, 25 or less % of the weight more than 3% weight. At less than 3%, if phase separation depressor effect is low and exceeds 25 % of the weight, viscosity will increase and the evil of the addition of a color or other additives being restricted will come out. Moreover, by including glycols, such as this thiodiglycol, showed that poor printing by dryness in the front face of a nozzle of ink was reduced. a simple substance, mixture, etc., such as 1, 4-butanediol, 1,5-pentanediol, 1, 6-hexandiol, a propylene glycol, a dipropylene glycol, tripropylene glycol, neopentyl glycol, the 2-methyl -2, 4 pentanediol, a trimethylol propane, and trimethylolethane, had such an effect other than a thiodiglycol as a certain thing

[0033] In order to take out practicality from the above thing based on improvement in qualities of printed character, such as bleeding, mustached reduction, etc. to record media-ed, such as paper, by the combination of a propylene-glycol-n-butyl ether, a dipropylene-glycol-n-butyl ether, and an acetylene glycol system surfactant. Suppression of the phase separation by the water-soluble glycol ether, the addition of the surfactant of an acetylene glucohol system and a limit of HLB, a convention of surface tension, adoption of the shaker style of the ink in the nose of cam of a nozzle, reduction of the printing disorder by the fluorochemical surfactant, reduction of the printing disorder by dryness of the ink in the phase separation and the nozzle nose of cam by addition of glycols, etc. show that the high ink for ink-jet record of practicality is made.

[0034] In addition, various change is possible, unless it should not think that this invention is limited to these examples but deviates from the main point of this invention.

[Translation done.]